CLAIMS

1. A portable heater comprising:

a housing having an air inlet, an air outlet, an exterior surface and a front;

a plurality of baffles located within the housing; and

a heating element located within the housing, the heating element capable of heating air flowing from the air inlet to the air outlet in a natural convection mode;

wherein the baffles are constructed and arranged to help maintain at least a portion of the exterior surface of the housing at or below a threshold temperature during heating in at least a natural convection mode and at least one of the baffles is positioned between the front of the housing and the heating element.

2. The heater of claim 1 wherein the plurality of baffles comprises at least two substantially vertical baffles.

3. The heater of claim 2 wherein the heating element includes an electric heating element positioned between the two substantially vertical baffles near the air inlet.

4. The heater of claim 1 further comprising a safety device that causes heat output by the heating element to be reduced when an overheat condition is detected.

5. The heater of claim 4 wherein the safety device comprises one of a bimetal strip, a thermistor, and a thermal fuse.

6. The heater of claim 1 wherein at least a portion of the air inlet is located on a bottom portion of the housing and at least a portion of the air outlet is located on a top portion of the housing.

7. The heater of claim 1 further comprising a fan that urges air to move into the housing through at least a portion of the air inlet in a forced convection mode.

8. The heater of claim 1 wherein the heating element comprises an electric resistance heating element.

9. The heater of claim 1 wherein the threshold temperature is about 170 degrees Celsius.

10. The heater of claim 1 wherein the housing is substantially a rectangular box that is less than about 30 cm tall, less than about 60 cm long and less than about 20 cm wide.

11. The heater of claim 1 wherein the housing comprises structural components capable of being manufactured by a roll forming process.

12. The heater of claim 1 wherein the heating element is an electric heating element arranged for a heat output up to about 1500 Watts, and the threshold temperature is about 150 degrees Celsius.

13. The heater of claim 1 further comprising at least one end cap that supports the housing.

14. The heater of claim 1 wherein at least one of the air inlet and the air outlet are formed in or included in a grill capable of being formed in a punch press process.

15. A portable heater comprising:

a housing having an exterior surface;

a heating element positioned inside the housing and constructed and arranged to heat air; and

at least two substantially vertical baffles positioned inside the housing and defining an interior zone enclosing at least a portion of the heating element and defining a secondary zone defined by an area outside of the interior zone and inside the housing;

wherein the at least two baffles, the housing and the heating element are arranged to operate in a natural convection heating mode while maintaining the exterior surface of the housing below a threshold temperature.

16. The heater of claim 15 further comprising a safety device that causes heat output of the heating element to be reduced when an overheat condition is detected.

17. The heater of claim 16 wherein the safety device comprises one of a bimetal strip, a thermistor, and a thermal fuse.

18. The heater of claim 15 wherein the housing has an air inlet, and further comprising a fan that urges air to move into the housing through at least a portion of the air inlet in a forced convection mode.

19. The heater of claim 18 wherein the heating element is an electric heating element positioned substantially between the at least two substantially vertical baffles near the air inlet.

20. The heater of claim 15 wherein the heating element comprises an electric resistance heating element.

21. The heater of claim 15 wherein the heating element has a heat output at least 750 Watts.

22. The heater of claim 15 wherein the housing has a volume of less than about 16,500 ccm.

23. The heater of claim 15 wherein the housing has a volume of about 15,000 ccm.

24. The heater of claim 15 wherein the housing is substantially a rectangular box that is less than about 30 cm tall, less than about 60 cm long and less than about 20 cm wide.

25. The heater of claim 15 wherein the threshold temperature is about 170 degrees Celsius.

26. The heater of claim 15 wherein the housing has a volume of about 15,000 ccm, the heating element has a heat output of about 1500 Watts and the threshold temperature is about 150 degrees Celsius.

27. A portable heater comprising:

a housing having an exterior surface, an air inlet and an air outlet, both the air inlet and the air outlet comprising less than about 25% of a surface area of the housing, the housing having a volume of less than about 18,000 ccm; and

a heating element located within the housing;

the heater capable of sustained operation in a natural convection heating mode while maintaining the exterior surface of the housing below a threshold temperature of about 170 degrees Celsius.

28. The heater of claim 27 wherein at least a portion of the air inlet is located on a bottom portion of the exterior housing and at least a portion of the air outlet is located on a top portion of the exterior housing.

29. The heater of claim 27 further comprising a safety device that causes the heating element to reduce heat output when an overheat condition is detected.

30. The heater of claim 27 further comprising first and second substantially vertical baffles positioned within the housing, the first baffle extending along at least a portion of a front of the housing and the second baffle extending along at least a portion of a rear of the housing, the heating element being positioned between the first and second baffles such that the first baffle is positioned between at least a portion of the

heating element and the front of the housing, and the second baffle is positioned between at least a portion of the heating element and the rear of the housing.

31. The heater of claim 27 further comprising a fan that urges air to move into the housing through at least a portion of the air inlet in a forced convection mode.

32. The heater of claim 27 wherein the heating element comprises an electric resistance heating element.

33. The heater of claim 27 wherein the housing is substantially a rectangular box that is about 25 cm tall, about 55 cm long and about 13.5 cm wide.

34. The heater of claim 27 wherein the housing comprises structural components capable of being manufactured by a roll forming process.

35. The heater of claim 27 wherein at least one of the air inlet and the air outlet are formed in or included in a grill capable of being formed in a punch press process.

36. The heater of claim 27 wherein the threshold temperature is about 150 degrees Celsius.

37. The heater of claim 36 wherein the housing has a volume of about 15,000 ccm.

38. The heater of claim 37 wherein the heater has a heat output of at least about 1500 Watts.

39. A portable heater comprising:

a housing having an exterior surface, an air inlet, an air outlet and a total volume in cubic centimeters; and

an electric heating element located within the housing;

wherein the heater has a heat output of at least 750 Watts in a natural convection mode while maintaining the exterior surface of the housing below a threshold temperature of about 170 degrees Celsius, a ratio of the heat output to the total volume of the housing being at least about 0.082.

40. The heater of claim 39 wherein the heater has a heat output of up to 1300 Watts in a natural convection mode.

41. The heater of claim 39 wherein the heater has a heat output of up to 1500 Watts in a natural convection mode.

42. The heater of claim 39 wherein the threshold temperature is about 150 degrees Celsius.

43. The heater of claim 42 wherein the ratio of the heat output to the total volume of the housing is at least about 0.09.

44. The heater of claim 43 wherein the heater has a heat output of at least about 1500 Watts.

45. The heater of claim 39 wherein the ratio of the heat output to the total volume of the housing is approximately 0.1.

46. The heater of claim 39 wherein the plurality of baffles comprises at least two substantially vertical baffles.

47. The heater of claim 39 wherein at least a portion of the air inlet is located on a bottom portion of the exterior housing and at least a portion of the air outlet is located on a top portion of the exterior housing.

48. The heater of claim 39 further comprising a safety device that causes the heating element to reduce heat output when an overheat condition is detected.

49. The heater of claim 48 wherein the safety device comprises one of a bimetal strip, a thermistor and a thermal fuse.

50. The heater of claim 39 wherein the plurality of baffles comprises first and second substantially vertical baffles positioned within the housing, the first baffle extending along at least a portion of a front of the housing and the second baffle extending along at least a portion of a rear of the housing, the heating element being positioned between the first and second baffles such that the first baffle is positioned between at least a portion of the heating element and the front of the housing and the second baffle is positioned between at least a portion of the heating element and the rear of the housing.

51. The heater of claim 39 further comprising a fan that urges air to move into the housing through at least a portion of the air inlet in forced convection mode.

52. The heater of claim 39 wherein the heating element comprises an electric resistance heating element.

53. The heater of claim 39 wherein the housing has a volume of about 15,000 ccm.

54. The heater of claim 39 wherein the housing comprises structural components capable of being manufactured by a roll forming process.

55. The heater of claim 54 wherein all of the structural components are capable of being manufactured by a roll forming process.

56. The heater of claim 39 further comprising a supporting structure to elevate the housing.

57. The heater of claim 56 wherein the supporting structure includes at least one end cap.